Group: _____ _____ _____ Name: _____

ma138 Worksheet 19, November 7, 2017

1. For each limit, either evaluate it or show that it does not exist. If you need to approach $(0,0)$ along different paths, some good choices are the coordinate axes ($y = 0$, and $x = 0$), the line $y = x$, an arbitrary line $y = mx$, and a parabola $y = x^2$.

a)

$$\lim_{(x,y)\to(5,5)} \log_{10}(2x^2 + 10y) + x + y$$

b)

$$\lim_{(x,y)\to(0,0)} \frac{x^2 - 2y^2}{x^2 + y^2}$$

c)

$$\lim_{(x,y)\to(0,0)} \frac{x^2 + xy + y^2}{x^2 + y^2}$$

d)

$$\lim_{(x,y)\to(0,0)} \frac{x^2 y}{x^4 + y^2}$$

(this problem is a better example of the behavior I mentioned in class).

2. Use the limit definition of the derivative to evaluate both of the the partial derivatives of $f(x, y) = x^2 + xy$

3. Find all partial derivatives of the following functions

a) $g(x, y) = \sin(x + y)\cos(x^2)$

b) $h(x, y) = e^{x^2+y^2} + x$

c) $k(x, y, z) = xyz + x^2y^2z^2 + x^3y^3$